Claims

1. A method for positioning a digital template of a prosthesis based on computerized measurement of the width of the medullar space in an 2-dimensional projection image of the relevant bone into which the prosthesis is to be inserted, the method comprising:

   a. detecting, preferably automatically, the edges of the medullar space, the edges being detected in a region of interest.

   b. determining a position of the template along, such as parallel to, the main bone orientation in such a manner that one or more points on the template and one or more other points in the image has a pre-defined geometrical relationship

   c. determining an orientation of the digital template and a position orthogonal to the main bone orientation such that the contours of the templates fit the detected edges of the medullar space.

2. A method according to claim 1 wherein the main bone orientation is estimated on the basis of the edges of the medullar space and/or the periostal edges of the bone.

3. A method according to claim 1 wherein the main bone orientation is estimated by a digital filtering technique.

4. A method according to claim 1 wherein the 2-dimensional projection image covers at least part of the relevant bone and potentially extends to other body parts.

5. A method according to claim 2 wherein the prosthesis is a femoral shaft prosthesis and the bone into which it shall be inserted is the femoral shaft.

6. A method according to claim 2 wherein the image may be derived as an x-ray image.

7. A method according to claim 2 wherein the medullar edges in a cross-section of the bone is associated with the points of maximum intensity in the 2-dimensional projection image.

8. A method according to claim 2 wherein the fit between the template and the medullar edges is derived by minimising the distances between the template contour and the edges.

9. A method according to claim 2 wherein the contours of the digital template is represented as x- and y-coordinates in a coordinate system with a pre-defined origo.

10. A method according to claim 2 wherein the method is applied to plurality of templates and a best fitting template, if present, is presented at its optimal position and rotation.

11. A method according to claim 10 wherein the plurality of templates is sorted according to the calculated fit for each template.

12. A method according to claim 11 where a list of the sorted multiple templates is displayed to the user of the system.

13. A method according to claim 5 wherein the system prior to determining the template position and orientation assumes a movement and/or orientation of the relevant bone as a result of the operation such that certain post-operational geometrical properties of the prosthesis is obtained.

14. A method according to claim 13 wherein the relevant bone is assumed moved and/or rotated during the operation such that a certain offset and/or leg-length discrepancy are obtained as a result of the operation, an example of which is disclosed in figure 8 illustrating offset and leg-length discrepancy.

15. A method according to claim 14 wherein the position and orientation of the femoral shaft prosthesis is determined such that the certain offset and/or leg-length discrepancy are obtained as a result of the operation.

16. A method according to claim 15 wherein the position and orientation of the femoral shaft prosthesis is determined such that the resulting offset for the operated femoral shaft is identical to the offset for the other femoral shaft.

17. A system for positioning a digital template of a prosthesis based on computerized measurement of the width of the medullar space in an 2-dimensional projection image of the relevant bone into which the prosthesis is to be inserted, the system being adapted by conventional computer and imaging means to:

    a. detecting, preferably automatically, the edges of the medullar space, the edges being detected in a region of interest.

    b. determining a position of the template along, such as parallel, the to the main bone orientation in such a manner that one or more points on the template and one or more other points in the image has a certain geometrical relationship.

    c. determining an orientation of the digital template and a position orthogonal to the main bone orientation such that the contours of the templates fit the detected edges of the medullar space.

18. A system according to claim 17 wherein the main bone orientation is estimated by use of the system and on the basis of the edges of the medullar space and/or the periostal edges of the bone.

19. A system according to claim 17 wherein the main bone orientation is estimated by a digital filtering technique implemented in the system.

20. A system according to claim 17 wherein the 2-dimensional projection image covers at least part of the relevant bone and potentially extends to other body parts.

21. A system according to claim 17 wherein the prosthesis is a femoral shaft prosthesis and the bone into which it shall be inserted is the femoral shaft.

22. A system according to claim 17 wherein the comprising a digizing device, such as a scanner or a digital x-ray apparatus, to obtain the digitised image, the image may be derived as an x-ray image.

23. A system according to claim 18 wherein the medullar edges in a cross-section of the bone is associated with the points of maximum intensity in the 2-dimensional projection image.

24. A system according to claim 18 wherein the fit between the template and the medullar edges is derived by minimising the distances between the template contour and the edges.

25. A system according to claim 17, comprising a database storing the contours of the digital template, the digital template, and preferably the contours thereof, being represented as x- and y-coordinates in a coordinate system with a pre-defined origo.

26. A system according to claim 25, wherein a plurality of templates is stored and a best fitting template thereof, if present, is presented at its optimal position and rotation.

27. A system according to claim 26, wherein the plurality of templates is sorted according to the calculated fit for each template.

28. A system according to claim 17 wherein a list of the sorted multiple templates is displayed to the user of the system.

29. A system according to claim 17 wherein the system prior to determining the template position and orientation assumes a movement and/or orientation of the relevant bone as a result of the operation such that certain post-operational geometrical properties of the prosthesis is obtained.

30. A system according to claim 29 wherein the relevant bone is assumed moved and/or rotated during the operation such that a certain offset and/or leg-length discrepancy are obtained as a result of the operation, an example of which is disclosed in figure 8 illustrating offset and leg-length discrepancy.

31. A system according to claim 30 wherein the position and orientation of the femoral shaft prosthesis is determined such that the certain offset and/or leg-length discrepancy are obtained as a result of the operation.

32. A system according to claim 31 wherein the position and orientation of the femoral shaft prosthesis is determined such that the resulting offset for the operated femoral shaft is identical to the offset for the other femoral shaft.

33. A system according to claim 17, comprising at least one of the following devices: scanners for digitizing images, pointing devices operatively connected to a computer with one or more screens in such a manner that landmarks may be set and a visualization of the image with template, calculation devices performing numerical calculations and storing devices storing the digital templates and/or a digital x-ray apparatus providing digitized x-ray images.